Lessons Learned from Two Decades of Barrier Island Restoration in Louisiana

State of the Coast Conference
New Orleans, LA

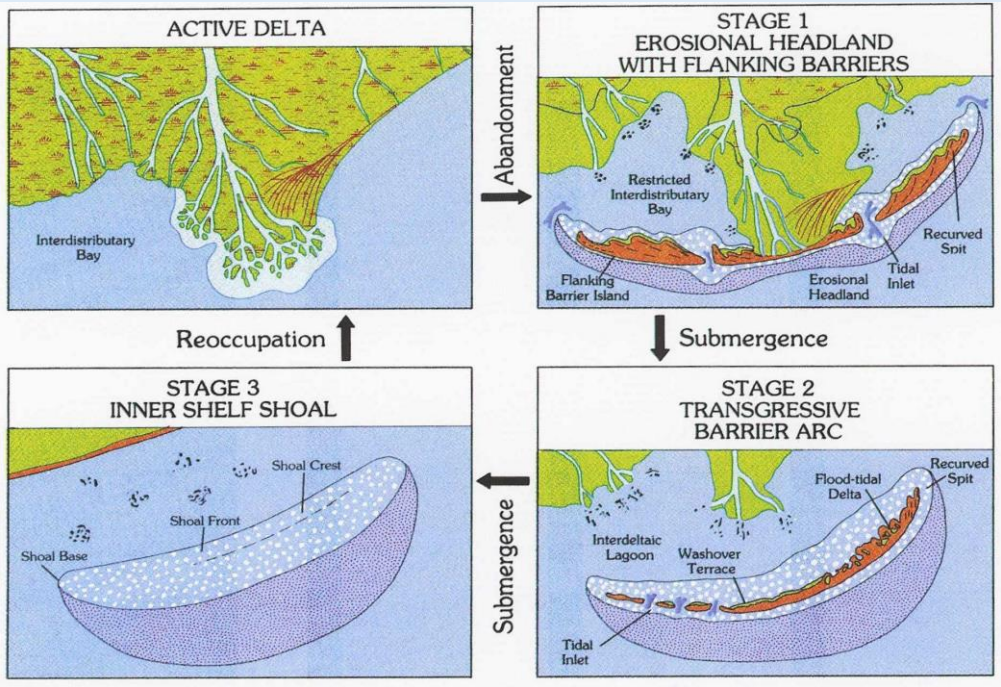
June 1, 2018

CPRA
Coastal Protection and Restoration Authority of Louisiana

committed to **our coast**

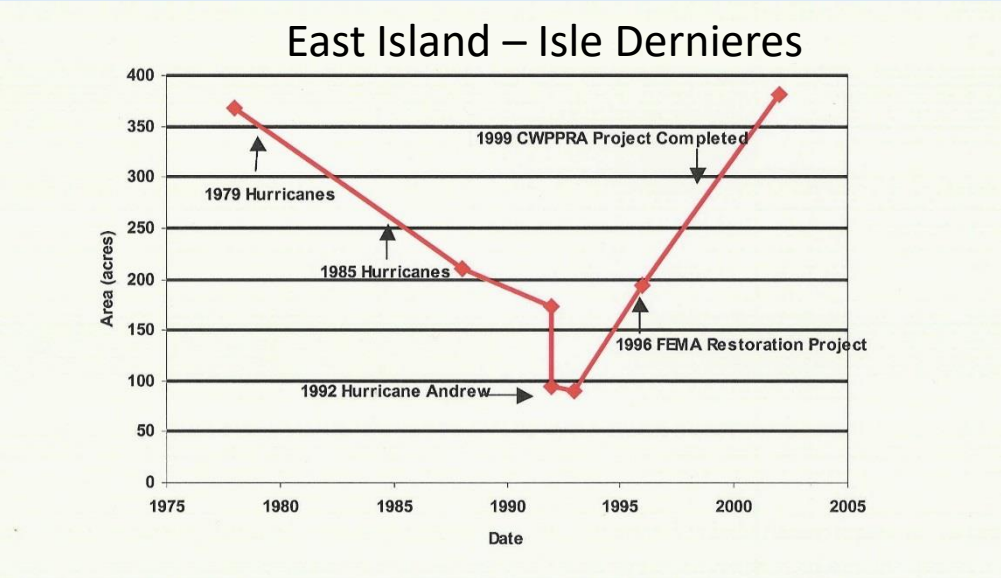
Louisiana Barrier Islands -

- Formed during delta lobe abandonment
- Finite supply of sand
- Increasing Tidal Prisms w/Land Loss

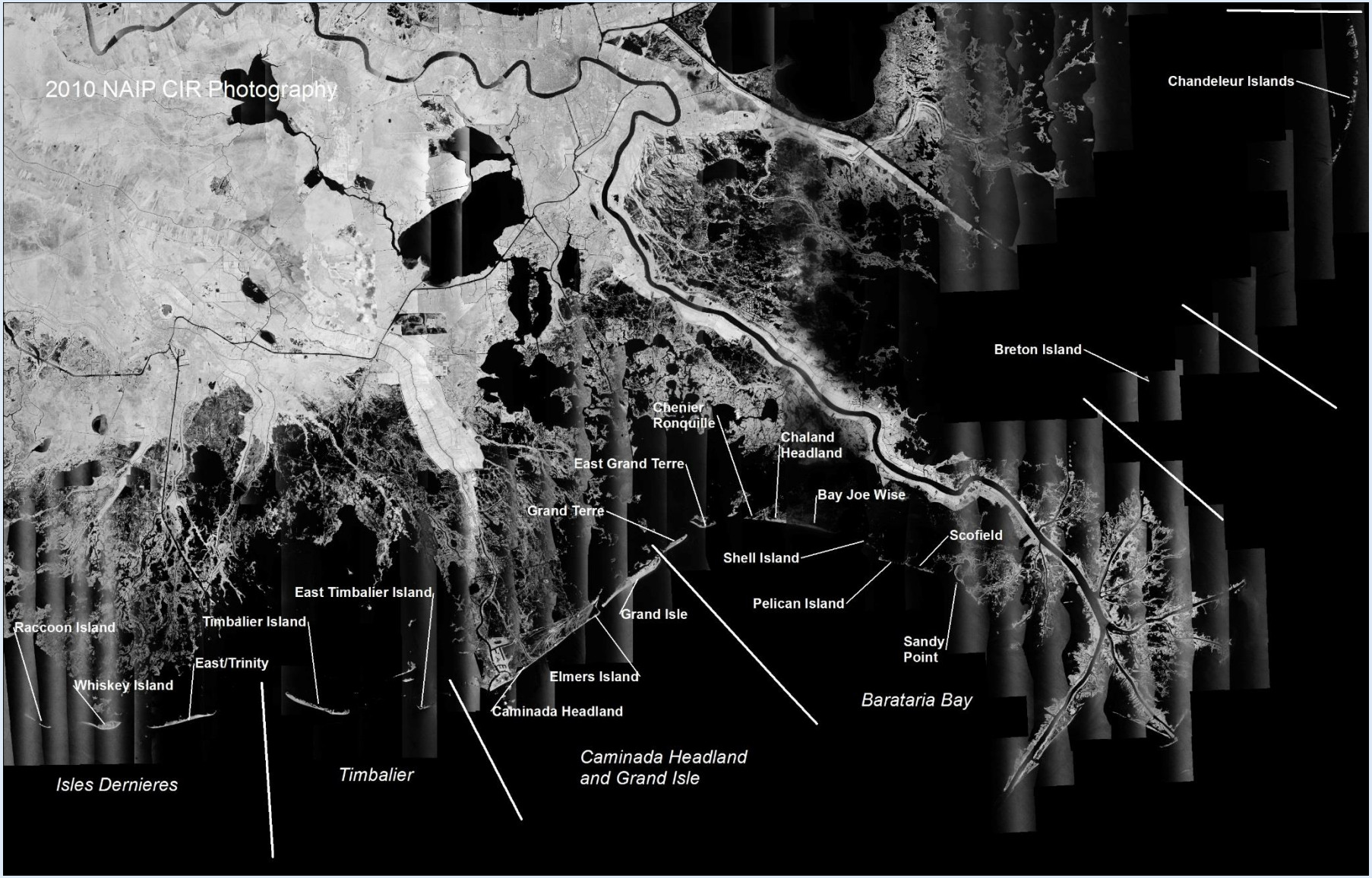


Restoration Goals -

- Supply sand to the system
- Increase longevity
- Create habitats

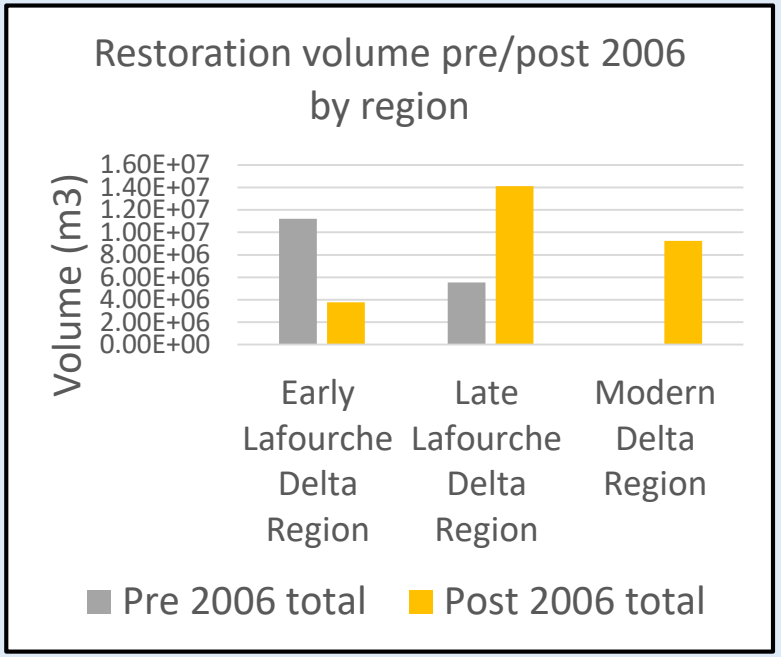


LOUISIANA'S DELTAIC BARRIER SHORELINES



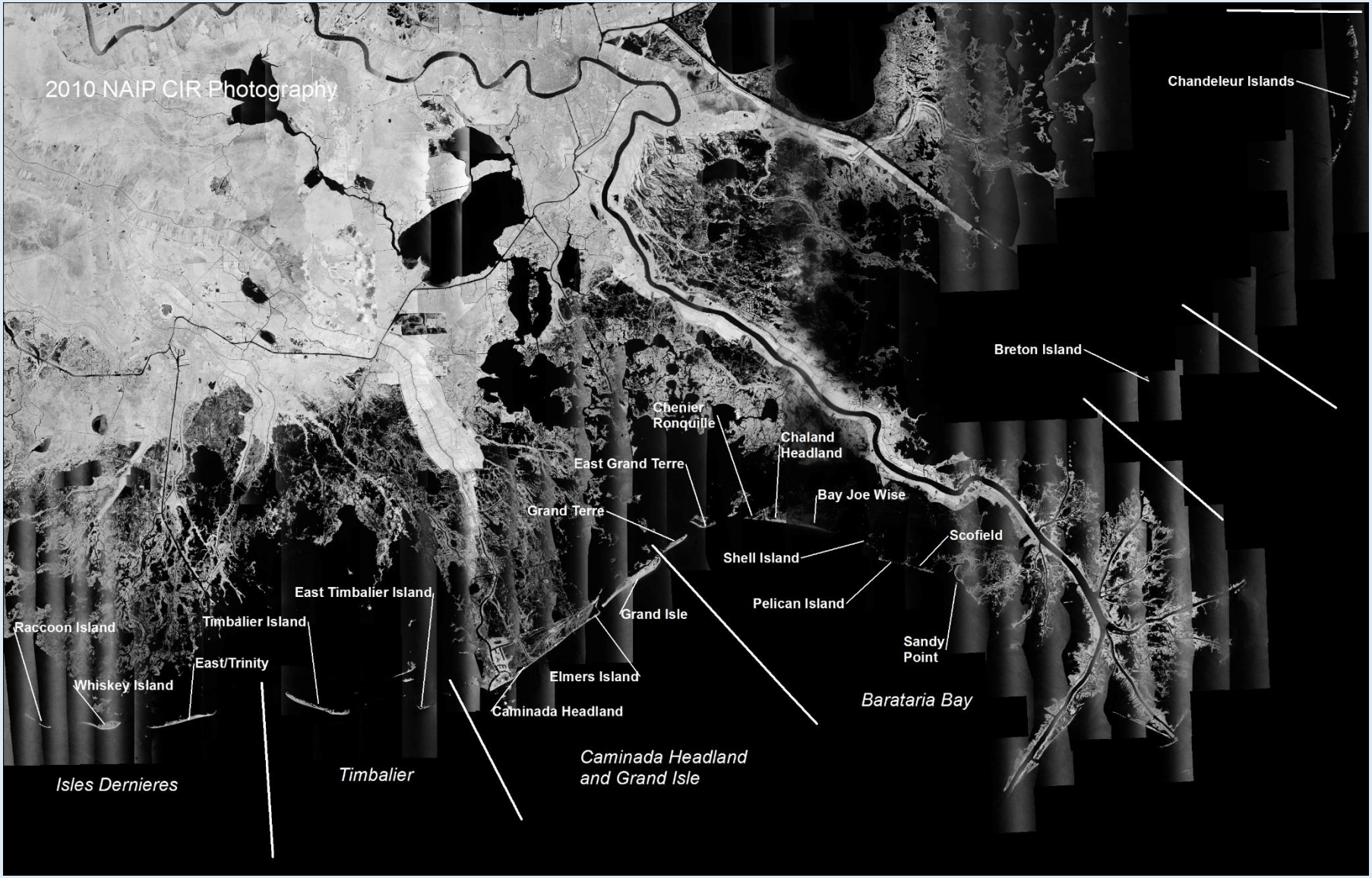
LOUISIANA BARRIERS ISLANDS RESTORATION PROJECTS

	Construction Date	Volume m3
Early Lafourche Delta Region *(Raccoon Island to Wine Island)*		
Raccoon Island Repair and Restoration Project (TE-106)	1994	
Raccoon Island Breakwaters Demonstration (TE-29)	1997	
Whiskey Island Restoration (TE-27)	1999	4.51E+06
Isles Dernieres Restoration East Island (TE-20)	1999	2.98E+06
Isles Dernieres Restoration Trinity Island (TE-24)	1999	3.71E+06
Raccoon Island Shoreline Protection/Marsh Creation (TE-48)	2007	5.62E+05
New Cut Dune and Marsh Restoration Project (TE-37)	2007	6.56E+05
Whiskey Island Back Barrier Marsh Creation (TE-50)	2009	2.00E+06
NRDA - Cailloui Headlands Barrier Island Resoration (TE-100)	2018	7.80E+06
Raccoon Island Shoreline Protection and Marsh Creation (TE-48, part 2)	2013	5.62E+05
Late Lafourche Delta Region *(Timbalier to East Grand Terre Island)*		
Timbalier Island Planting Demonstration (TE-18)	1996	
East Timbalier Island Sediment Restoration, Phase 1 (TE-25 and 30)	2000	2.02E+06
Vegetative Plantings of a Dredged Material Disposal Site on Grand Terre Island (BA-28)	2001	
Timbalier Island Dune and Marsh Creation (TE-40)	2004	3.52E+06
East Grand Terre Island Restoration (BA-30)	2010	2.40E+06
Bayside Segmented Breakwaters at Grand Isle (BA-50)	2012	2.56E+06
West Belle Pass Barrier Headland Restoration (Te-52)	2012	3.18E+06
Caminada Headland Beach and Dune Restoration (BA-45)	2015	2.20E+06
Caminada Headland Beach and Dune Restoration INCR2 (BA143)	2015	3.78E+06
Modern Delta Region *(East Grand Terre to Sandy Point)*		
Pass La Mer to Chaland Pass Restoration (BA-38, part 1)	2007	2.88E+06
Pass Chaland to Grand Bayou Pass Barrier Shoreline Restoration (BA-35)	2008	1.90E+06
Emergency Berms W8,W9,W10	2010-2011	
Barataria Barrier Island Complex Project: Pelican Island and Pass (BA-38, part 2)	2012	1.90E+06
Riverine Sand Mining/Scofield Island Restoration (BA-40)	2013	2.58E+06
	Total =	**5.17E+07**

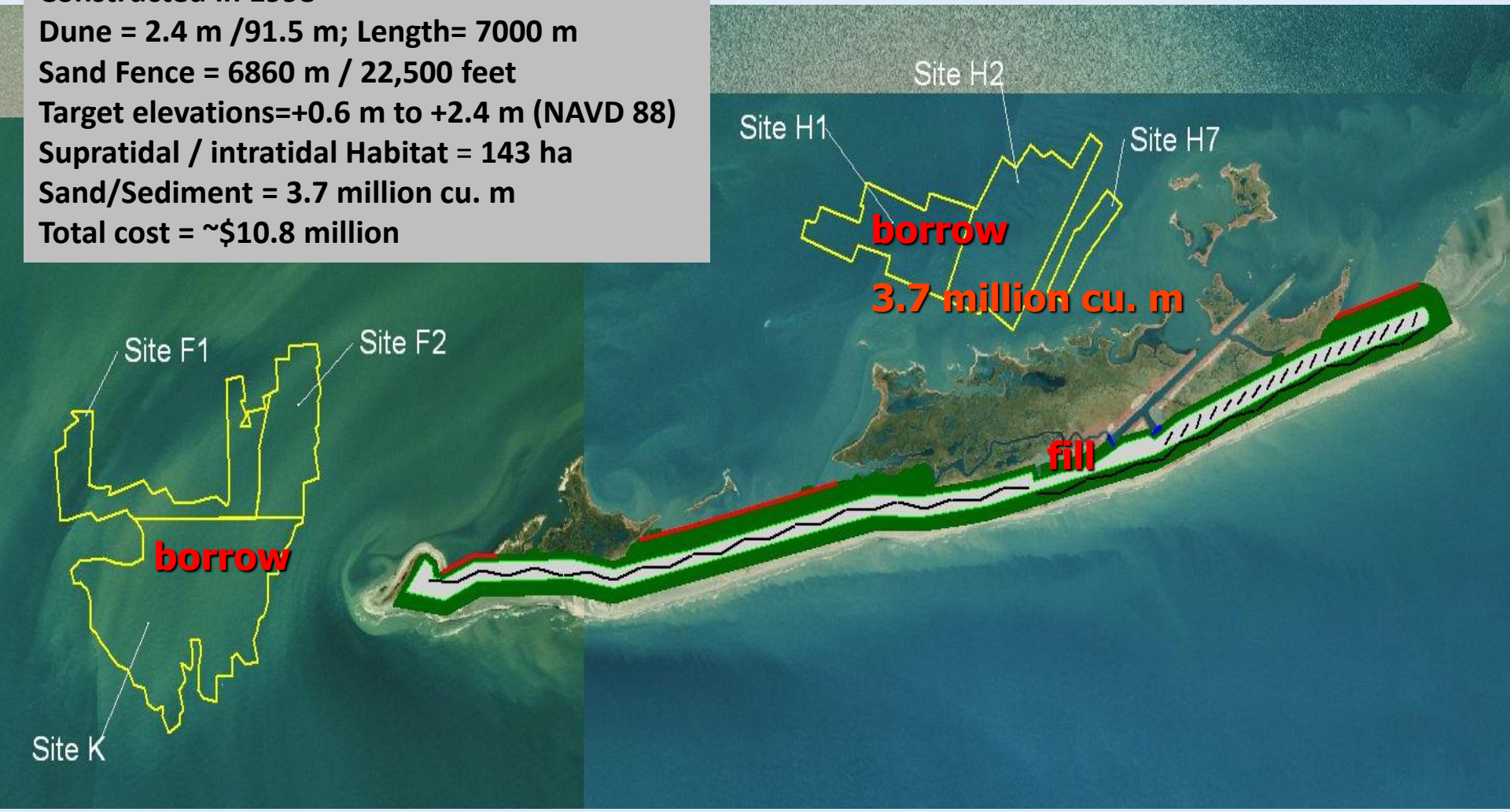


Since 1997, at least **51,700,000 m³** of sediment has been used to nourish LA barrier islands along the central portion of the coast.

LOUISIANA'S DELTAIC BARRIER SHORELINES

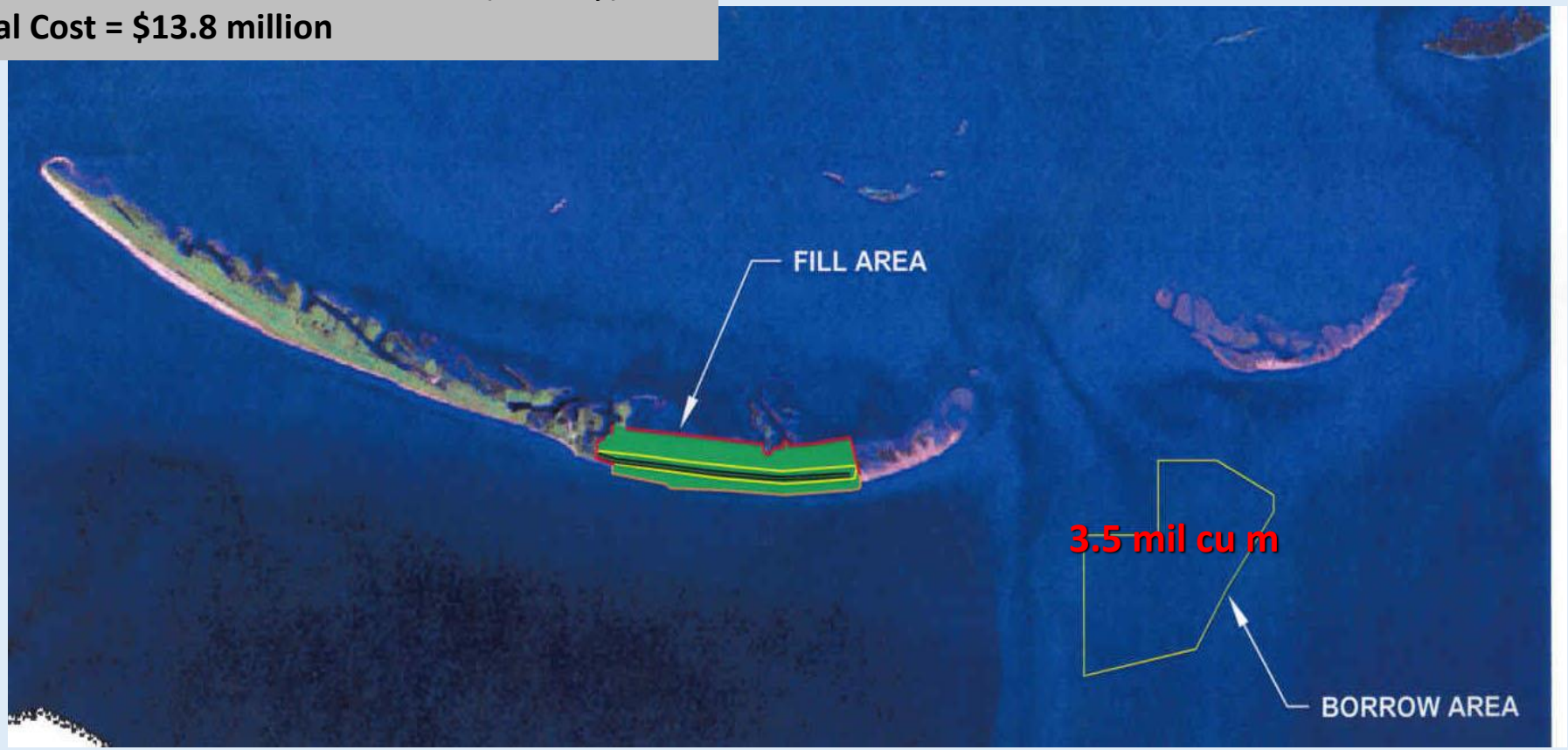


Constructed in 1998
Dune = 2.4 m /91.5 m; Length= 7000 m
Sand Fence = 6860 m / 22,500 feet
Target elevations=+0.6 m to +2.4 m (NAVD 88)
Supratidal / intratidal Habitat = 143 ha
Sand/Sediment = 3.7 million cu. m
Total cost = ~$10.8 million



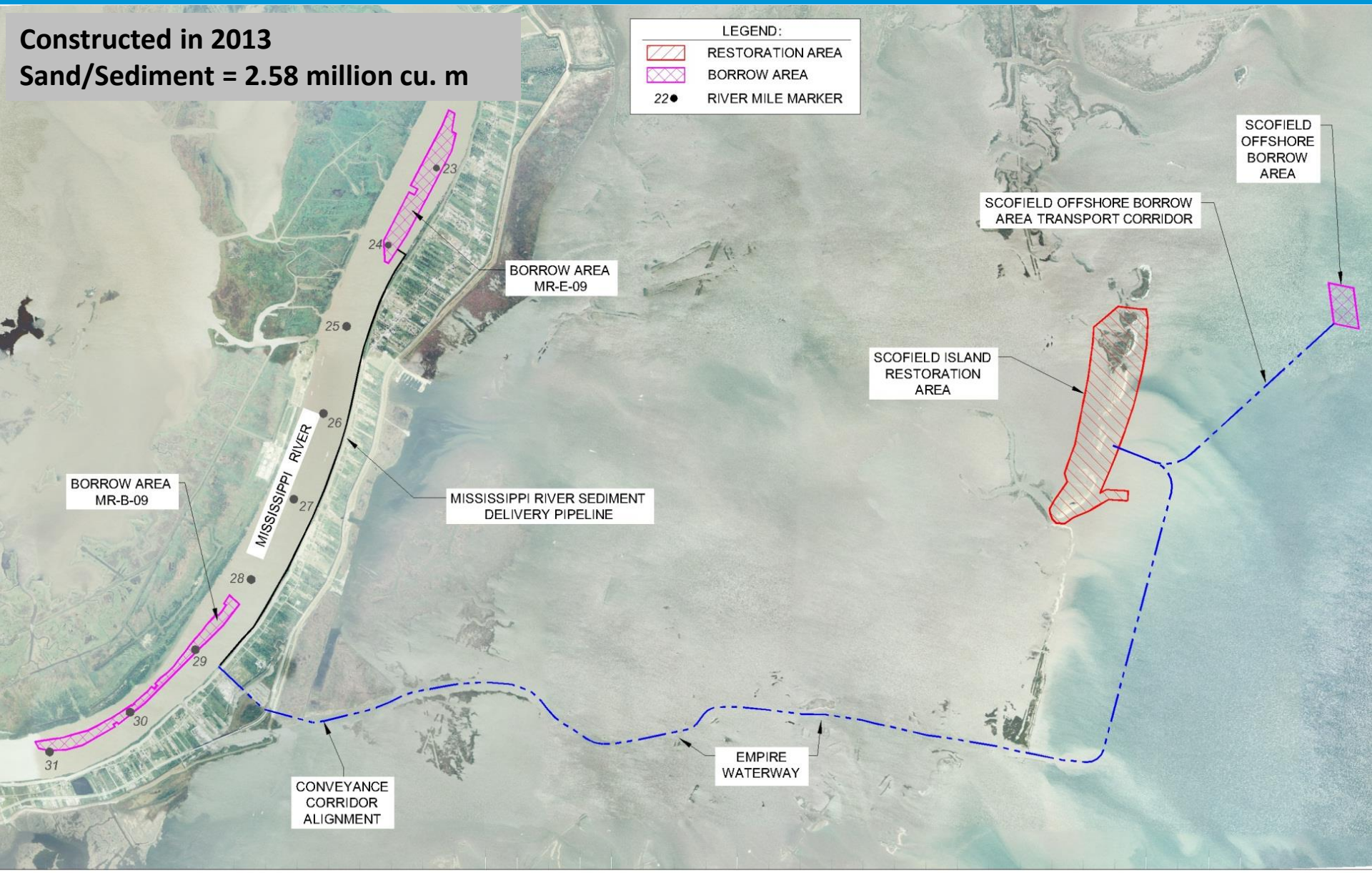
Trinity Island Restoration Project

Constructed in 2004
Dune crest = 122 m *{400'}*
Dune Height = 2.4 m *{+8'}*
Total Fill area = 110 ha *{273 acres}*
Marsh Created = 80 ha *{196 acres}*
Sand/Sediment = 3.5 million cu m *{4.6 mcy}*
Total Cost = $13.8 million



Timbalier Island Restoration Project

Constructed in 2013
Sand/Sediment = 2.58 million cu. m



Scofield Island

Scofield Island

NRDA Caillou Lake Headlands (TE-100)

- **Project Features:**
  - ➢ 7.8 million CM of sediment
  - ➢ Restore 754 Ac. beach/dune habitat
  - ➢ Restore 179 Ac. back barrier marsh
- **Funding: NRDA**
  - ➢ Construction Cost: $103M
- **Status:**
  - ➢ Const. Complete: May 2018

FEATURE	DESIGN DIMENSION
MARSH EL.	+2.4' NAVD88
BEACH EL.	+4.2' NAVD88
BEACH SLOPE	1V:25H
DUNE EL.	+6.4' NAVD88
DUNE SLOPE	1V:30H

Construction Complete May 2018

Lessons Learned -

- Planning
- Engineering and Design
- Construction
- Operation & Maintenance
- Monitoring

Belle Pass Spit - 29º06`02” / 90º17’17” View to the east-southeast

Lessons Learned -

- Planning
  - Private Property
  - Oil and Gas Infrastructure
  - Measurable Goals and Obj.
  - Programmatic Approaches
- Engineering and Design
- Construction
- Operation & Maintenance
- Monitoring

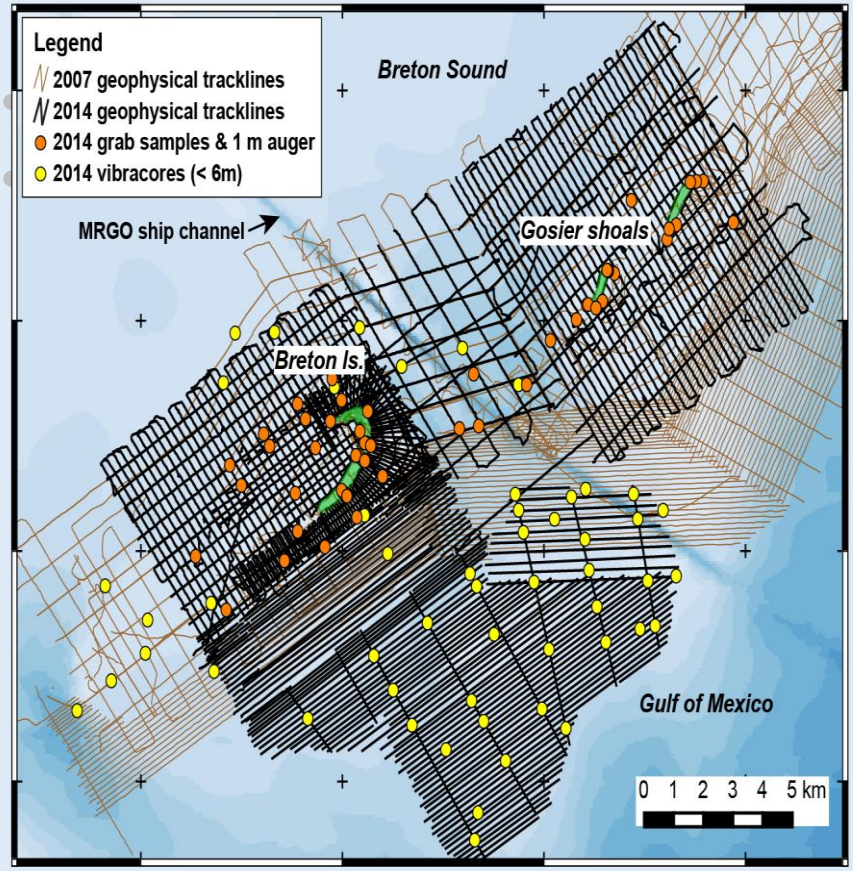
Lessons Learned -

- Planning
- Engineering and Design
  - Construct Marshes
  - Better Borrow Design
  - Loading
- Construction
- Operation & Maintenance
- Monitoring

Trinity Island - 29º02`46” / 90º47’00” View to the east

Lessons Learned -

- Planning
- Engineering and Design
  - Construct Marshes
  - Geotech – Borrow Design



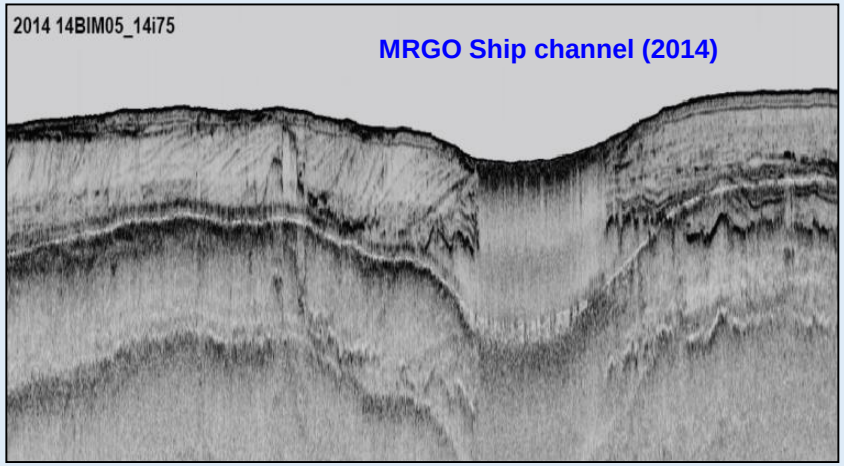
GENERAL GUIDELINES:
EXPLORATION FOR SEDIMENT RESOURCES FOR
COASTAL RESTORATION

COASTAL PROTECTION AND RESTORATION AUTHORITY
CPRA

Recommended Citation

Khalil, S.M., 2016. *General Guidelines: Exploration for Sediment Resources for Coastal Restoration*. Baton Rouge, LA: Coastal Protection and Restoration Authority. Version_VII.pdf

Syed Khalil Page 1 Version VII - 10/5/2016



Lessons Learned -

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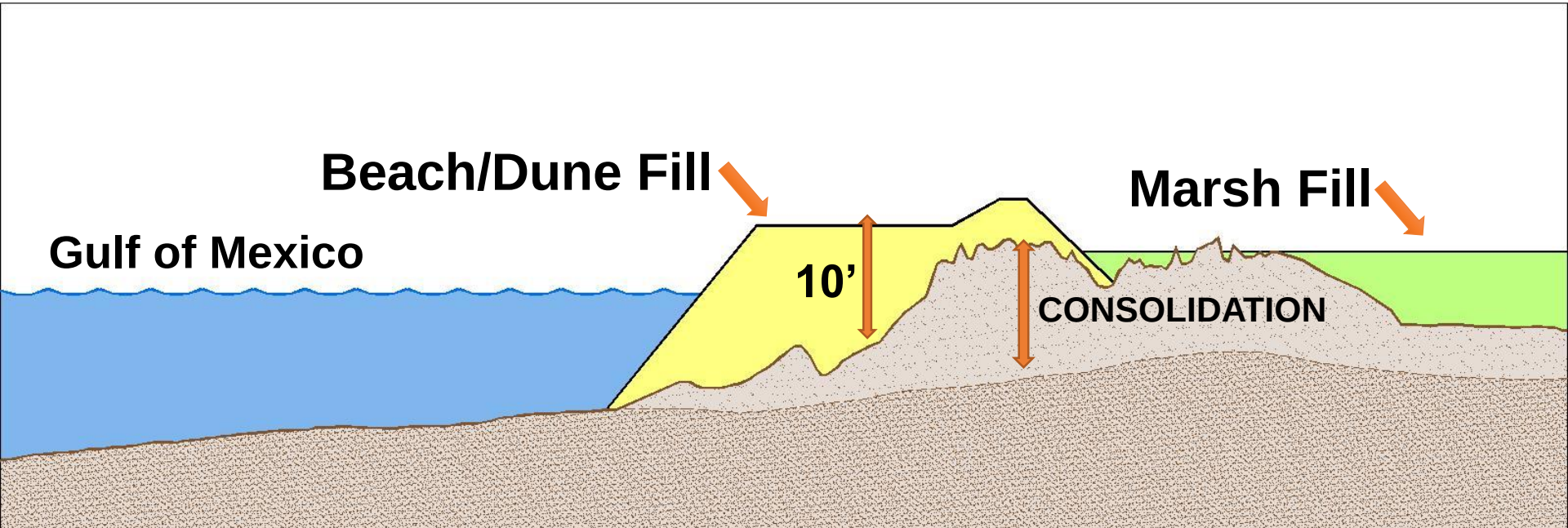
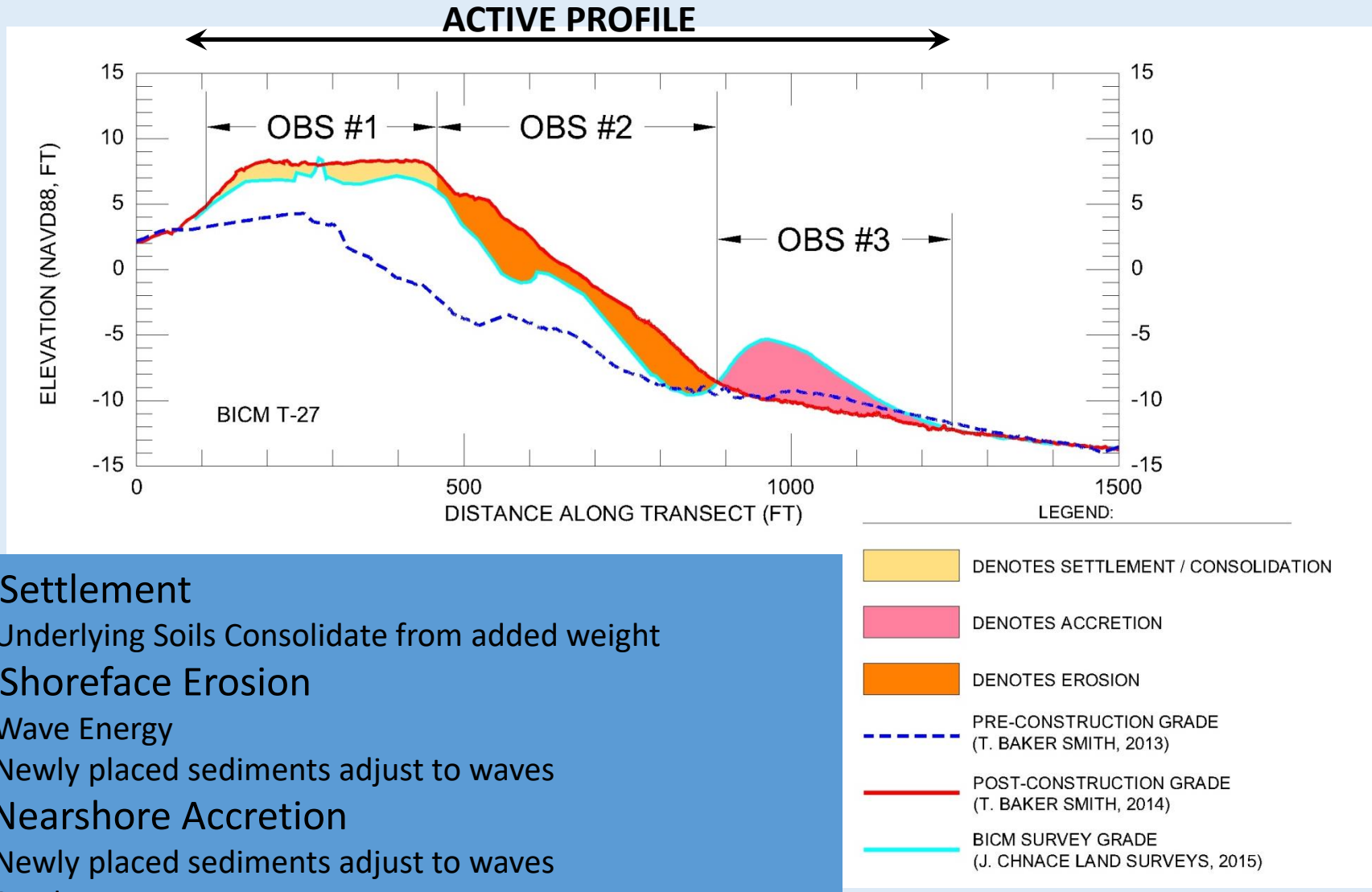
- Engineering and Design
  - Construct Marshes
  - Geotech – Borrow Design
  - Geotech - Loading

Primary Consolidation



Cam 1 Profile Comparisons



- # 1: Settlement
  - Underlying Soils Consolidate from added weight
- # 2: Shoreface Erosion
  - Wave Energy
  - Newly placed sediments adjust to waves
- #3: Nearshore Accretion
  - Newly placed sediments adjust to waves
  - Sand Bars Form

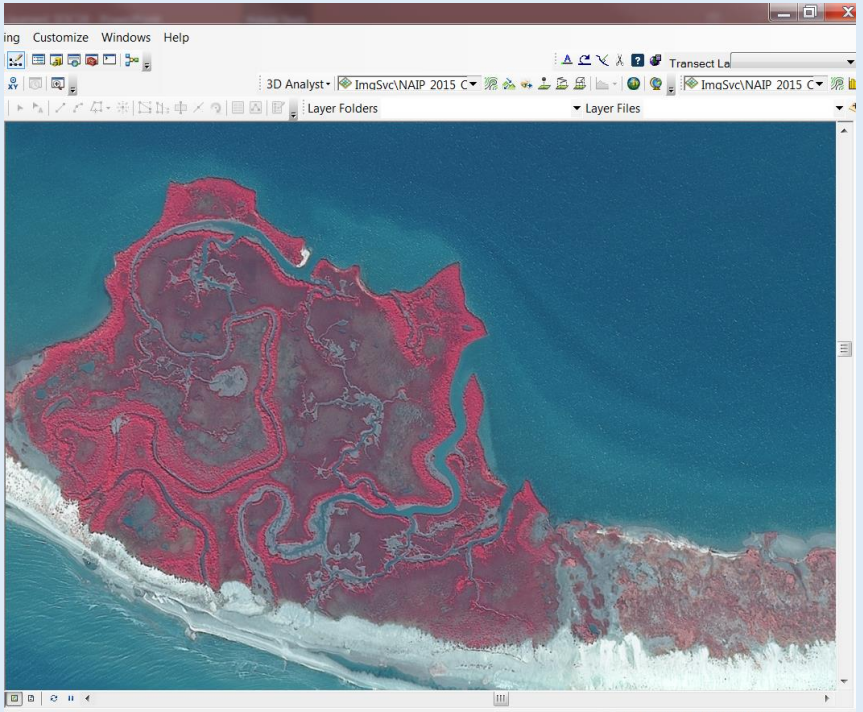
Lessons Learned -

- Planning
- Engineering and Design
- Construction
  - Design vs Constr Site Conditions
  - Beneficial Use of Outfall
  - Bird Abatement
- Operation & Maintenance
- Monitoring

Whiskey Island - 29º03`03” / 90º47’09” View to the west

Lessons Learned -

- Planning
- Engineering and Design
- Construction
  - Design vs Constr Site Conditions
  - Beneficial Use of Outfall



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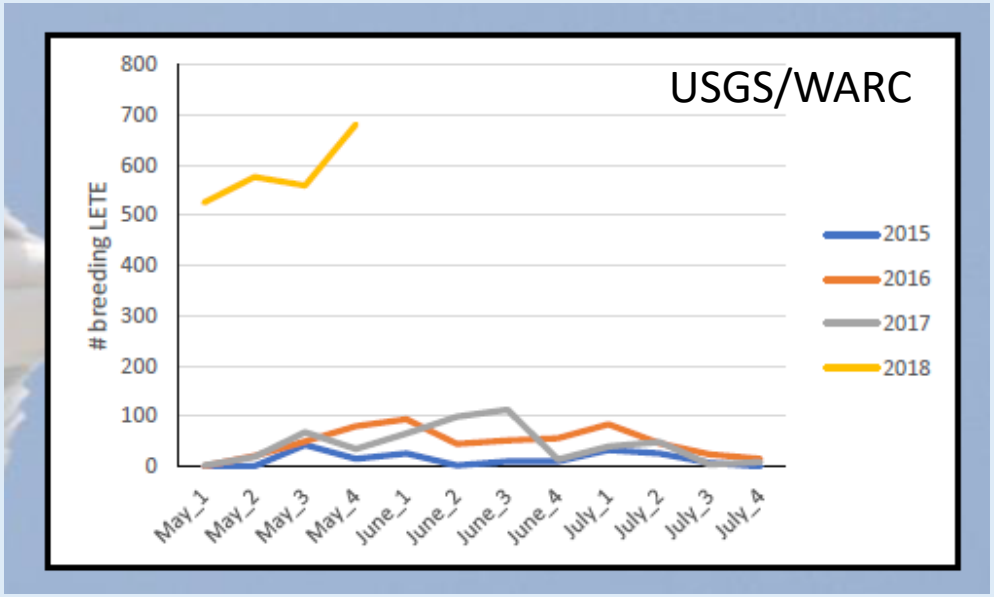

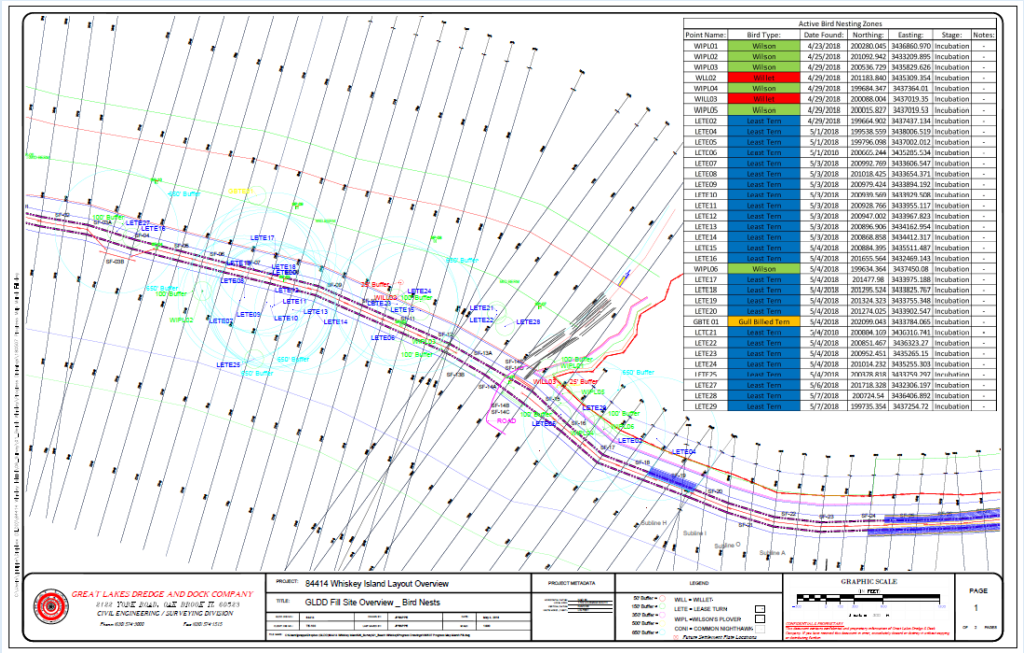

Lessons Learned -

- Planning
- Engineering and Design
- Construction
- Operation & Maintenance
  - Budgets
  - Vegetation Plantings
- Monitoring

Lessons Learned -

- Planning
- Engineering and Design
- Construction
- Operation & Maintenance
- Monitoring
  - Measurable Goals and Obj.
  - Project Extents
  - Programmatic

Goals:
The specific project goals are:

Create approximately 500 acres of beach and dune habitat using sediment from Ship Shoal.
Establish a beach and dune system.
Stabilize the dune platform using sand fencing, and vegetative plantings.
Establish vegetation cover of planted species along the newly constructed dune platform and primary dune system.
Contribute to the restoration of the littoral drift system along the eastern Caminada Headland.

Monitoring Goals:

To evaluate the created and remaining acreage to determine shoreline position, elevation change, and volume change (Project Goals 1, 2, 3, 4, 5)

Post-construction change rates for beach and dune elevations, volumes, and shoreline positions will be lower than pre-construction change rates.

To evaluate dune formation, stability and vegetative cover using vegetation sampling, habitat mapping and/or land/water ratio (Project Goals 1, 2, 3, 4, 5).

Maintain a minimum of the pre-existing acreages of beach and dune geomorphic forms throughout the 20 year project life

Post-construction beach and dune habitat acreage change rates will be lower than pre-construction change rates.

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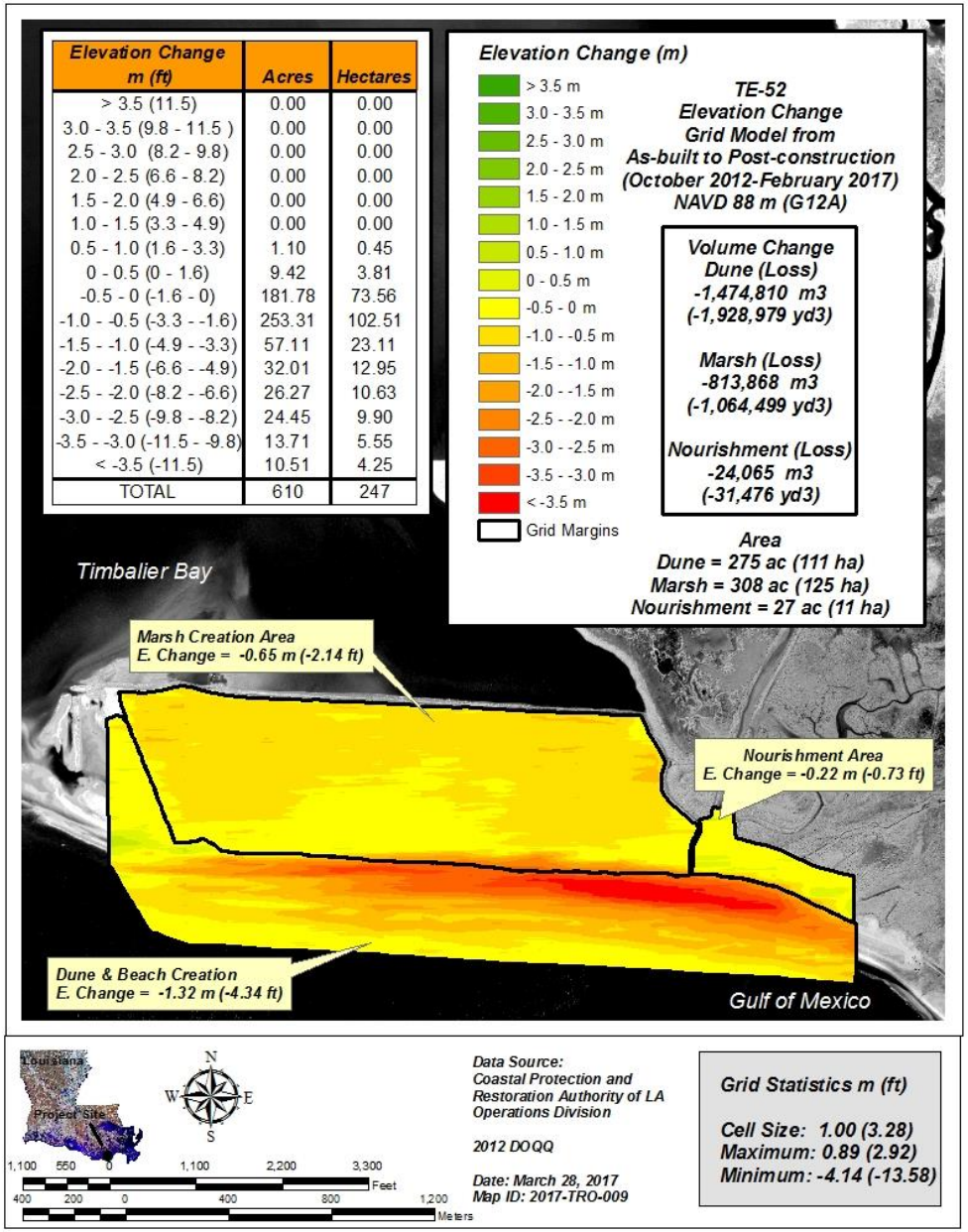

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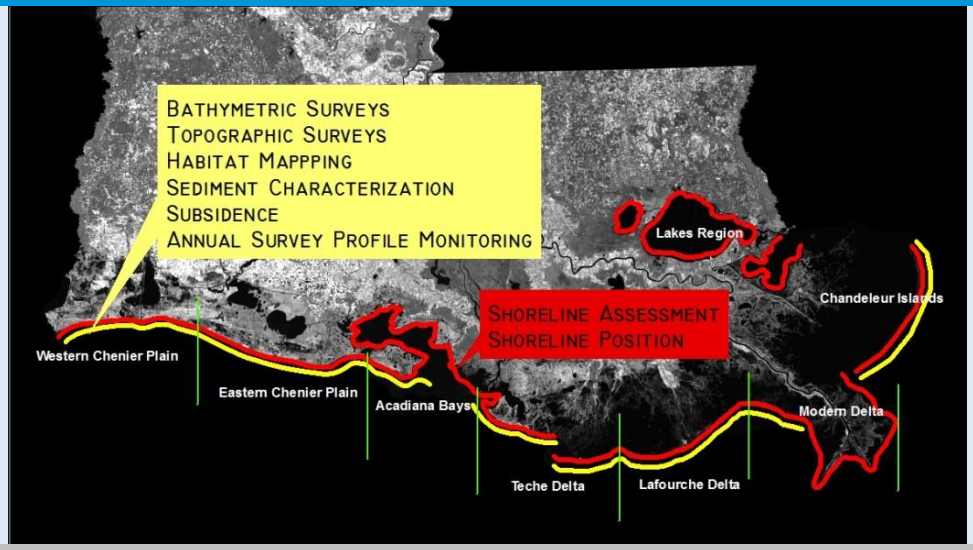

Shoreline Assessment – 2005, 2006/07, 2015-19
continue historic time series development

Shoreline position – 1880's, 1920-30's, 1980's, 1998, 2004, 2005, 2008, 2012 , 2015

Habitat Mapping/Land Loss – 1980's, 1996*, 2002*, 2004*, 2005*, 2008, 2015

Topographic Surveys – 1997, 2001, 2002, 2006, 2015-17,

Bathymetric Surveys – 1880's*, 1930's*, 1980's, 2006/07, 2015-17

Sediment Characterization – 2008, 2015-17

Subsidence – 2015-19 determine methods, scale, and implement (needs to integrate with SWAMP/CRMS)

Overwash & Recovery – 2015-19 determine methods, scale, and implement (Storm Impacts and over wash focus)

Vegetation Sampling – Develop Methods and determine costs for full Implementation

Process Data Sampling – to be determined (Winds, waves, currents, precipitation, etc…) (SWAMP)

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  - Oil and Gas Infrastructure
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  - Programmatic Approaches
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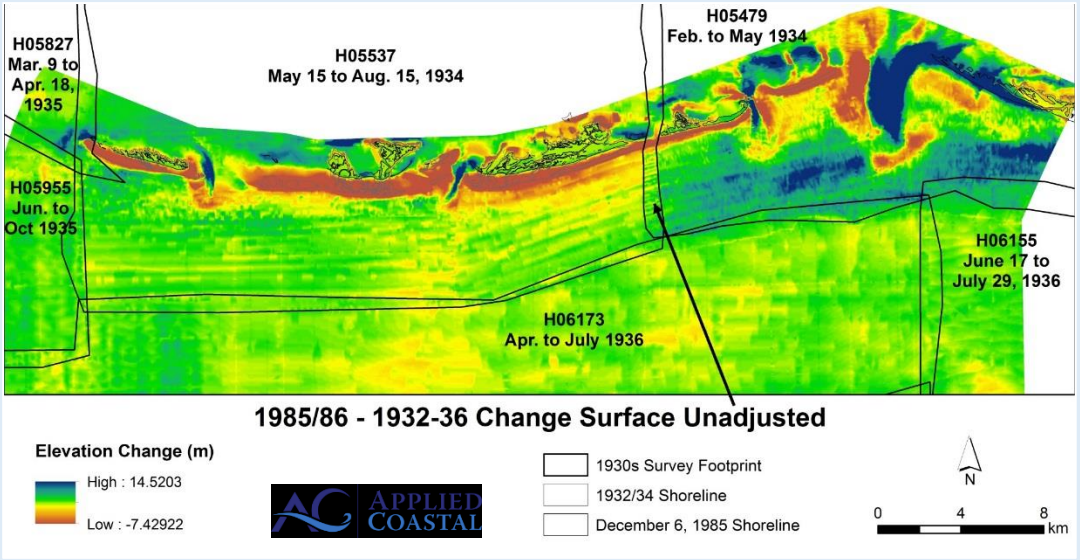

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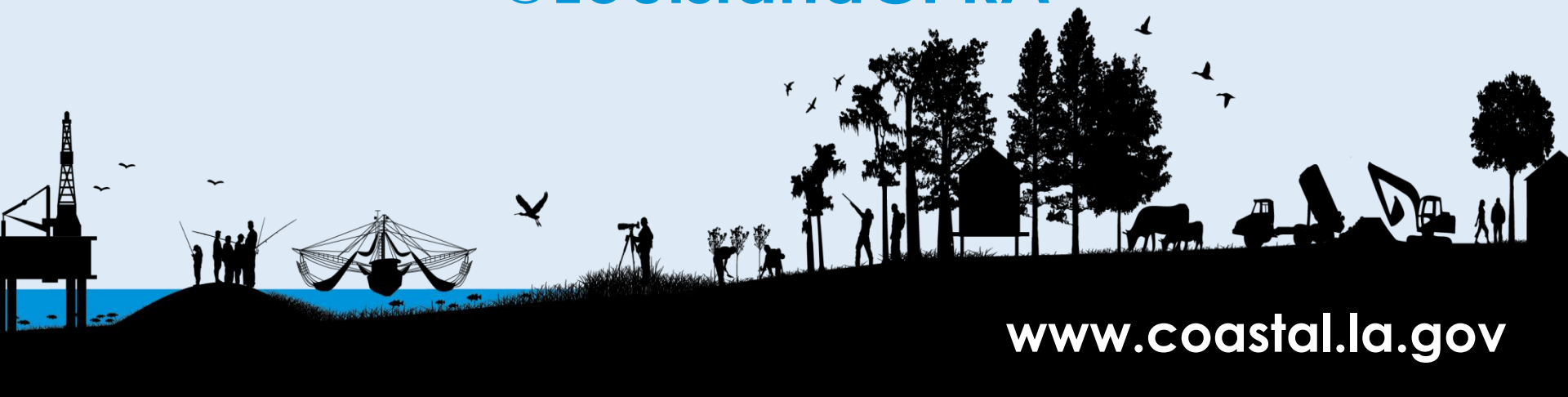

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